

use it is to be regarded solely as an accessory weapon in our armament for employment in conjunction with, not to the displacement of, other remedies.

I wish to express my thanks to those members of the staff of St. Bartholomew's who have allowed me to refer to patients who have been in their charge.

## REFERENCES.

- <sup>1</sup>Gay, *Typhoid Fever*, New York, 1918. <sup>2</sup>Cecil, Report on Forty Cases of Acute Arthritis treated by Intravenous Injection of Foreign Protein, *Arch. Int. Med.*, 1917, xx, 951. <sup>3</sup>Gow, Certain Phenomena Associated with Protein Shock Reaction, *Quart. Journ. Med.*, Oxford, xiii, 49, 82. <sup>4</sup>Auld, Pyrogenic Therapy, *BRITISH MEDICAL JOURNAL*, 1918, i, 195. <sup>5</sup>Nolf, *Presse Médicale*, liii, 485. <sup>6</sup>Nolf, *Ibid.*, 1919, ii, 93. <sup>7</sup>Nolf, *Ambulance de l'Océan*, 1917, i, 197. <sup>8</sup>Peterson, Protein Shock Therapy, *Arch. Int. Med.*, Chicago, 1917, xx, 716. <sup>9</sup>Miller and Lusk, Foreign Protein in the Treatment of Arthritis, *Journ. Amer. Med. Assoc.*, 1916, lxi, 1756. <sup>10</sup>Squier, *Michigan Med. Soc. Journ.*, 18, 6, 328. <sup>11</sup>Cowie and Bevan, *Journ. Amer. Med. Assoc.*, lxxii, 16, 1117. <sup>12</sup>Auld, *BRITISH MEDICAL JOURNAL*, July 20th, 1918.

## THE POISON OF THE SPINY DOG-FISH.

A CASE OF ACUTE OEDEMA THE RESULT OF A PRICK BY A DOG-FISH, AND A PRELIMINARY NOTE ON THE POISON GLAND OF THE SPINY DOG-FISH.

BY

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TOWARDS the end of October, 1919, a fisherman came up to the Lowestoft Hospital complaining of a poisoned hand. There was a punctured wound at the base of the thumb

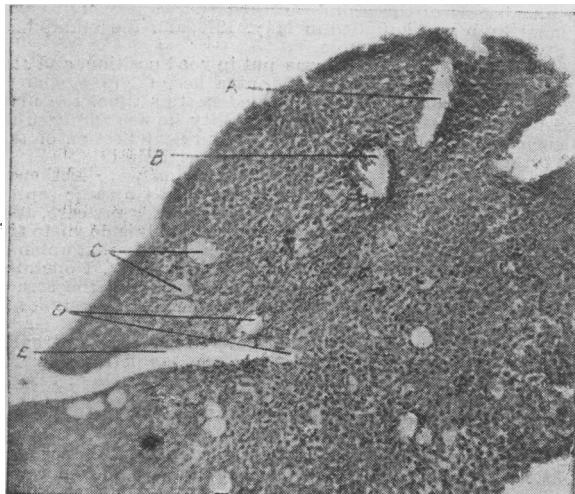


FIG. 1.—Section of gland showing ducts and vacuoles. A, Duct cut obliquely. B, Duct cut transversely. C, Vacuoles. D, Vacuoles bursting into inner end of duct. E, Duct. (From a micro-photograph by Dr. D. Hutchinson of a section by the author.)

Six hours previously he had been pricked by a dog-fish. The injury was followed by acute stabbing pain in the part which lasted four or five hours; the hand then began to swell, and when he arrived at the hospital there was great swelling and oedema of the back of the hand, and the front of the wrist and forearm were painful, tender, red, and oedematous.

This acute inflammatory oedema lasted for four days and for a time it seemed that suppuration would occur. On the fifth day the oedema at the back of the hand had subsided, but it was not until seven days had elapsed that the tenderness and swelling over the wrist had disappeared and the patient was convalescent.

The treatment adopted was to paint the hand and the front of the wrist and forearm with liniment and solution of iodine in equal parts and to apply hot fomentations.

Owing to the length of time that had elapsed since the injury no special treatment was applied to the wound; if the case had been seen earlier a weak solution of potassium permanganate would have been injected into the site of the puncture, as this is known to have an immediate effect on the pain and symptoms of poisoning in cases of the sting from the envenomed spines of the greater and lesser weever.

As this was the first case of injury by a dog-fish that had occurred in my experience, I was anxious to investigate

the nature of the poison if any existed, and for this purpose I obtained a number of fresh spines, which at that time could be easily obtained from the steam trawlers which were landing large catches of dog-fish.

*The Spines and Poison Gland of the Spiny Dog-fish or Spur-dog, Acanthias vulgaris* (Gray, Cat. British Museum).

This, the commonest dog-fish, also known as the picked dog-fish, under which name it is described and pictured by Couch,<sup>2</sup> has a sharp, strong spine in front of each of the two dorsal fins. The usual length of the fish is from 18 in. to 2 ft.



Spiny dog-fish. After Cunningham.

The accompanying sketch is taken from Cunningham's *Marketable Marine Fishes*,<sup>1</sup> and shows diagrammatically the position of the two dorsal spines.

The anterior spine is the longer, is slightly curved, and measures an inch or more in length, while the posterior is nearly straight, and is shorter—from half an inch to three-eighths of an inch in length. The posterior aspect of each spine is grooved, the groove becoming more shallow towards the point.

When examined with the naked eye, each groove is seen

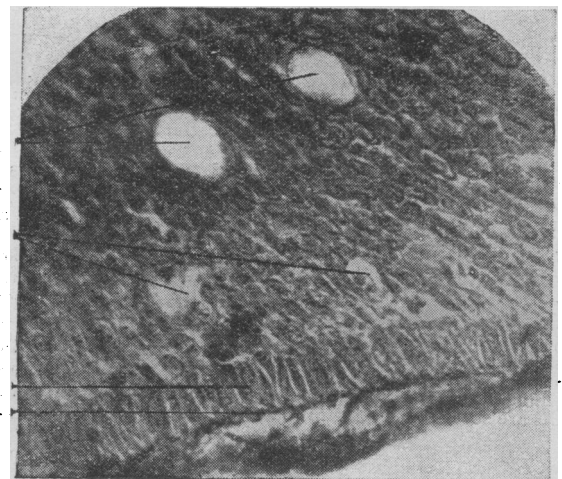


FIG. 2.—Section of gland showing basement membrane and columnar cells. A, Vacuoles. B, Commencing formation of vacuoles. C, Columnar cells. D, Basement membrane. (From a photograph by Dr. D. Hutchinson of a section by the author.)

to be occupied by a glistening, pearly-white substance, and towards the base there may be seen in its centre a small linear depression about one-sixteenth of an inch long, which is often discoloured, possibly by the presence of a secretion poured out by the glandular structure in the centre of which it lies.

This pearly-white structure was removed from the groove and teased on a slide; the teased gland showed follicles in which layers of epithelial cells could be demonstrated surrounding a central mass of cells and granular matter staining by the van Gieson method, just as does the secretion of the weever's poison gland. Small detached portions showed columnar cells against a basement membrane, and upon them layers upon layers of round and cubical cells, some vacuolated, and some distended with granular matter in which the nuclei alone were distinguishable.

I have cut a series of sections of the hardened gland, the details of which I hope to publish elsewhere. The gland consists of a number of follicles which discharge their contents into the groove. It commences at the junction of fin and groove, and here it is partially enclosed in a chitinous framework; it gradually becomes smaller and finer as the tip of the spine is approached, to the apex of which it does not reach for a variable distance, usually about one-eighth of an inch or more.

I have at present no experiments to publish on the nature of the secretion, but it seems a justifiable conclusion to attribute the acute pain and inflammatory oedema, the result of the prick by the spine, to some venom produced by this remarkable glandular structure lying in the groove.

As far as I am aware there is no previous description, in the literature of fish with poison organs, of a poison gland in *Acanthias*. Dr. Tate Regan, of the British Museum of

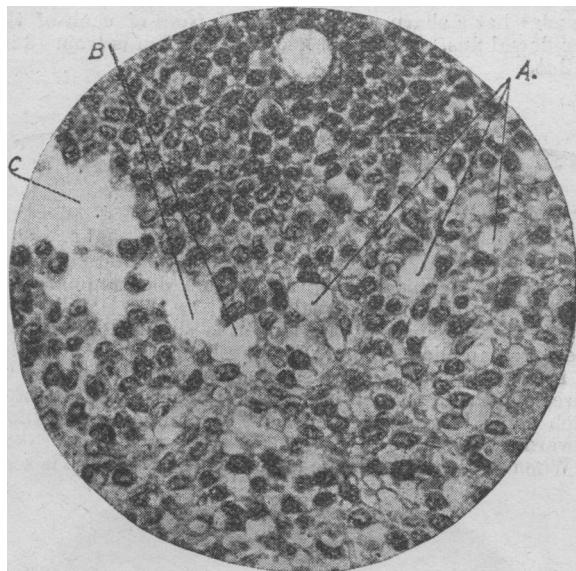


FIG. 3.—Section of gland stained with haemalum and counter-stained by van Gieson method. A. Vacuoles. B. Vacuoles bursting into commencement of duct. C. Duct.

Natural History, kindly\* referred to such sources of reference as were unavailable to me, and to him my thanks are due for always extending ready help and advice to those engaged in research.

#### Description of the Gland.

The histological appearances of the gland lying in the grooved spine of the spur-dog are as follows: The two low-power microphotographs show the general structure, and the high-power the changes in the cells which take place during secretion. That portion of the gland lying deepest in the groove consists of cylindrical cells on a basement membrane. Superficial to these cells are several layers of round cells the nuclei of which stain



FIG. 4.—Section showing root of fin where it joins the base of spine (semi-diagrammatic). A. Gland dipping into recesses formed by (B) chitinous processes at base of fin. (The spine is not shown as the base of the fin is cut off where it joins the groove.) C. Large pigment cells. D. Connective tissue joining chitinous processes to (E) cartilage of the fin.

readily with haemalum, and in some areas the nuclei show marked evidence of activity, as exemplified by the presence of mitotic figures. Well-marked ducts dip into the substance of the gland, around which the cells become definitely flattened. These three types of cell are obviously transition forms of the same cell. In the neighbourhood of the duct areas are seen in which the cells are breaking down or disintegrating so as to give rise to a sponge-like appearance, and in these areas are also seen round lacunae in which phantoms of pale cells may be distinguished, and in one section one can see one of these lacunae bursting into the apex of a duct into which it is apparently discharging its contents.

If my observations are confirmed, the dog-fish adds one more to the examples of fish with poison organs, in the ranks of which the sting-ray has so recently found a place after centuries of scientific doubt.<sup>3</sup>

#### REFERENCES.

<sup>1</sup> Cunningham: *Marketable Marine Fishes*. <sup>2</sup> Couch: *Fishes of British Islands*, vol. i. <sup>3</sup> Evans: *Transactions of Zoological Society of London*, 1916.

## METASTATIC STAPHYLOCOCCAL INFECTION OF THE KIDNEY.

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AN account of the following case may be of interest as illustrating infection of the kidney following upon operative interference with an infected wound of the forearm, the difficulty of making an early and accurate diagnosis of the condition, and the success of treatment by an autogenous vaccine.

A pensioner, aged 32, had undergone amputation through the lower third of the right thigh, and had an old gunshot wound of the left forearm, with an ununited fracture of the ulna in its upper third. He was wounded in both these situations on November 10th, 1917, in France, and the leg had been amputated at the casualty clearing station within a day or two of his wound; the forearm was cleaned and splinted. The subsequent history of the thigh is that it was reamputated and sutured at a general hospital in France on December 8th, 1917, and an abscess of the stump drained in January, 1918. An artificial limb was supplied in May, 1918, and the stump had not given any further trouble.

The fractured left forearm was put in good position, and the wound sutured in January, 1918, at a hospital in England; though the wound apparently healed at this time, the ulna remained ununited, and for this disability he was admitted as a pensioner to the Special Military Surgical Section of the 1st Northern General Hospital on December 19th, 1918.

On February 5th, 1919, the ends of the ulna were freshened and the bone plated; the wound subsequently became septic. In the beginning of May the patient came under my care, and, as a sinus was still present in the forearm leading down to the site of operation, and x-ray examination showed that union of the bone was apparently proceeding satisfactorily, I operated on May 6th, excised the sinus completely, removed the screws and plate, applied bipp to the wound, and closed it completely without drainage.

The wound healed by first intention, and has given no trouble since; but on the evening of May 19th the temperature, which had been normal since the third day after operation, rose to 100° and continued to rise in "step-ladder" fashion till, on the evening of May 23rd, it reached 104.4°. This pyrexia was accompanied by malaise, slight vomiting, vague pain in the bladder region, frequency of micturition, and strangury; the patient stated that on May 19th he had "passed a few drops of blood with the urine," but, as this specimen was not saved, the statement could not be confirmed. Though he felt "shivery" there was never any actual rigor. No abnormal physical signs could be detected in any system, and he was put on light diet and a simple diaphoretic mixture.

Naked-eye and chemical examination of the urine revealed no abnormality; but on May 23rd a trace of albumin and some pus were present, and on the following day a specimen was taken for bacteriological examination. Hexamine, gr. x thrice a day, with large quantities of fluid, was then prescribed. No abnormal physical sign was detected till, on May 26th, he complained of pain in the left loin, and bimanual palpation of the left kidney region elicited marked tenderness, though no tumour could be made out. The laboratory report received on May 27th stated: "Few red corpuscles and a fair number of pus cells present; no tubercle bacilli or *B. coli* detected; *Staphylococcus pyogenes aureus* present."

The diagnosis of acute metastatic pyelonephritis could now be made. A second specimen of urine was sent to the bacteriologist for the preparation of an autogenous vaccine.

Meantime the temperature had been gradually falling since May 26th, reaching 99° or 100° in the morning, but rising to 102° to 103° in the evening; and on May 29th the daily range settled down to between 99° and 100°. The second laboratory report was identical with the first, except that pus was present in greater quantity; and, pending the preparation of the autogenous vaccine, I gave 125 million of a stock staphylococcal vaccine on June 3rd; this produced a slight general reaction; no reaction followed 250 million given on June 7th and 500 million on June 11th.

The patient's general condition meantime was still unsatisfactory; he was anaemic and very weak, suffered from profuse sweats, loss of appetite, and vomiting after practically every meal. The hexamine was discontinued on June 11th, as it was thought that it might be the cause of the vomiting. Kidney tenderness was still present, but no tumour or enlargement of the organ could be made out.